Mental disturbances occurring in women at the menopause are commonly assumed to be due to the menopause, but the explanation of this differs according as they are mild or severe. If mild—taking the form of anxiety and depression, along with neurovascular symptoms such as flushing—endocrine changes are held responsible, and the benefits of replacement therapy with female sex hormones in most cases confirms the explanation. If severe, however—usually a psychosis with gross anxiety and depression—constitutional predisposition and psychological factors are more often invoked than endocrine ones: the illness is similar in form to those occurring in the involutinal phase of life, when the menopause has perhaps for years been a closed chapter, and from this and the frequent failure of oestrogen-therapy to relieve the condition it has been inferred that the endocrine changes are of little consequence, many writers pointing rather to the causes for unhappiness and frustration which may lie in the obvious cessation of reproductive life. It is hard to credit that a mild mental disturbance at the menopause could be due to different causes from those of a severe one at the same time of life. It seemed that one way of studying the problem would be to compare the incidence of mental disturbance in women who had suffered an artificial menopause through surgical removal of the ovaries with the incidence in women whose uterus had been removed before they had reached the menopause. In both groups of women the periods would have ceased and reproductive life would be clearly at an end: the psychological factor would therefore presumably be equally operative in both
and any inherited constitutional factors would be as likely in one group as in
the other. In those on whom oophorectomy had been performed, the endocrine
factor would also be present: if they had a higher incidence of mental dis-
turbance than those with hysterectomy, it would be the endocrine change that
was likely to be responsible.

The clinical difficulties in deciding whether a mental disturbance is meno-
pausal are considerable. Menopausal illnesses are in form indistinguishable
from neuroses or insanity of the same age period in men, or in women who are
still years away from their menopause. The menopause, moreover, is a hard
thing to time exactly. The cessation of the periods may be deceptive. Some
psychoses (Farrar and Franks, 1931) called menopausal turn out to have
been only psychoses which were accompanied by a temporary amenorrhoea.
Direct studies of menopausal psychoses have been somewhat unsatisfactory,
and the significance of the menopause in causing the depressions and anxieties
of middle-aged women doubtful, even when the two undoubtedly coincide.
The following investigation was intended to throw light on the rôle the
menopause may play in provoking mental changes, whether as a direct sequel
of the endocrine changes, or as a psychological reaction to permanent and
certain loss of fertility, the "change of life."

Sixty-seven women who had been operated on by the gynaecologist were the
subject of study. Forty-two of these had had their uterus removed, one or
both ovaries being left intact. The twenty-five others had had their uterus and
both ovaries removed. The names and notes of the patients were generously
put at our disposal by Mr. W. Gilliatt, C.V.O., and Mr. A. C. Palmer, O.B.E.,
who had operated on them at King's College Hospital, and to whose co-opera-
tion we owe the opportunity of carrying out the inquiry. The patients were
visited in their homes on one or more occasions, four years (in some cases five)
after the operation, and details about their state before and, especially, since the
operation obtained from them; in some instances also from their nearest
relatives. Of 128 patients operated on between the years 1930 and 1932, 66
were traced and visited, eleven had died (one of these is included in the present
inquiry), 31 had left London and could not therefore be visited, and 20 could
not be traced at all. None had been certified or admitted to a mental hospital:
information supplied by the Board of Control confirmed this.

As the endocrine changes entailed by double oophorectomy are believed
(Kurzrok and Smith, 1938) to be closely akin to those of the normal
menopause, though more sudden, any conclusions drawn from psychiatric
differences between the women whose ovaries had been removed (who may
be called the castrated women) and those who still had one or both ovaries
but no uterus, are presumably applicable to the normal menopause. Certainly
for the majority, or all, of the castrated women in this series there was
nothing in the psychological situation to make it different for them from that
confronting the others (who had had a hysterectomy)—or from that of a
woman passing through the normal menopause, except in its abruptness.
This would not be true unless each of the three groups mentioned were of
similar composition as regards other factors bearing on the mental state:
a preponderance in one group, for instance, of patients with a history of previous mental illness would partly invalidate any conclusion of the kind mentioned. The composition of the two groups of women investigated here showed no gross divergency in such respects.

Nature of the Material

The patients whose ovaries had been removed (Group A) were an older group, on the whole, than the others, as may be seen in Table 1. This is inevitable, since the surgeon will not often remove both ovaries in a woman unless she is near the menopause (or past it: no such cases were included in this study), and on the other hand it was desirable for the purposes of the investigation that the "sterilized" group should not be of an age at which spontaneous menopause was likely to occur within the period of observation. Incomplete attainment of the latter aim was a handicap in assessing the findings, as will be seen later.

<table>
<thead>
<tr>
<th>Table 1.—Number of Patients in Age-Groups</th>
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<tbody>
<tr>
<td>18-35 YRS.</td>
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<tr>
<td>Group A . . .</td>
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<tr>
<td>Group B . . .</td>
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</tbody>
</table>

The two groups did not differ in respect of intelligence and past working capacity. In physical health, prior to the illness for which they had been operated on, the two groups did not notably diverge: it was remarkable that either bilious attacks or anaemia, or both, were reported frequently (in 7 of the 25 patients in Group A, and in 14 of the 42 in Group B).

Five of Group A had had a neurotic illness at some time in their lives before the illness leading to their operation: so had nine of Group B. Eleven of Group A and 20 of Group B had all their lives up to the operation been of tense, worrying, restless temperament: it is obvious that only the most general statement on this matter can be accepted in view of the interval of years, the lack in most cases of detailed corroborative evidence, and the dependence of such traits upon varying circumstances. Unintentional falsification of their past psychological traits is especially likely to occur in neurotic persons.

The average age of onset for menstruation had been 14 in both groups and there was no noteworthy difference in the incidence of menstrual pains, depression, irritability, etc., in the two groups. All but two of Group A were married, and all but five of Group B: the average age at marriage of Group A was 24, of Group B 23. Of the married women five in Group A were frigid, and nine in Group B: in nine cases, no information was obtained, or it was too vague
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to be used. The married women in Group A had fewer children than those in Group B. (See Table 2.) There had also been fewer miscarriages among the women of Group A.

### Table 2.—Showing how many women had a given number of children

<table>
<thead>
<tr>
<th>NUMBER OF CHILDREN</th>
<th>TOTAL CHILDREN</th>
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<tr>
<td>0</td>
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<td>1</td>
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<td>9</td>
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<tr>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

- Group A: 4, 7, 6, 1, 1, 1, 1, —, —, —, 44
- Group B: 6, 8, 7, 4, 6, —, 3, 1, 1, —, 1, 101

The diseases for which gynaecological operation was performed on Group A were uterine fibroids in 15, ovarian endometrioma in two, ovarian cyst in five, inflammation of uterus or tubes in four; in some cases more than one of these was present. Polyps and adenomyomata were also found. The reported duration of symptoms varied between 1 month and 16 years; it was more than 1 year in eight cases. In Group B the diversity of diseases was greater, and they included fibroids, adenocarcinoma, endometrioma, polyps, cervicitis and endometritis, chronic subinvolution, prolapse, retroversion, and salpingitis; 16 had fibroids. There were also four in whom pregnancy was complicated by heart disease, etc., or by pelvic deformation that had already called for one or more caesarean sections. The duration of symptoms had been much greater than in Group A: 28 of the women had had symptoms for more than a year, and 13 of these had complained of symptoms for 4 years or more before the operation. All but two (who had only double oophorectomy) of Group A had panhysterectomy and bilateral salpingo-oophorectomy; in Group B, hysterectomy in one or other form, sometimes with and sometimes without the removal of the Fallopian tubes, had been carried out. There was no striking difference between the two groups in respect of post-operative complications or duration of convalescence: where the latter was prolonged, and the patient did not return to her ordinary work within a year after the operation, this seemed referable in both groups to the occurrence of menopausal symptoms or sequelae, as described in the next section, rather than to the actual operation. Such a distinction is, of course, not easy to draw, but may be illustrated by the frequent report by the women that their hair had fallen out just after the operation and they had lost weight, but that both these losses had been fully made good after a few months; changes of this sort would probably be directly attributable to the loss of blood, trauma, etc., of the operation: where, however, superfluous hair had developed, or the patient had become much fatter, the changes seemed more likely to be due to the artificial menopause.
**Effects**

To separate the physical from the psychological features of the menopause offers practical, as well as biological and theoretical difficulties. Flushings, for example, may be evoked by situations in a psychogenic way, e.g. in the familiar mild anxiety attack, as well as occur physiogenically, e.g. in response to heat or exertion. So many of the recognized menopausal symptoms are in the domain of the vegetative nervous system, where physical and psychological are hardly distinguishable, that this difficulty is to be expected.

For convenience the symptoms inquired after have been divided into two sets. In the former of these, of a more physical nature, are flushings, giddiness, breathlessness, headache, increase in weight, growth of hair, pains, cramps or other discomforts in the limbs, disturbed sleep, changed appetite, libido, and occurrence of any cyclical phenomena such as periodic swelling of the breasts. In the latter, or psychological, set are irritability, depression and lassitude, anxiety, impairment of memory or ability to concentrate, and restriction of interests. Any other neurotic symptoms, and the patient's attitude towards the operation, were also enquired into. The relationship of the anomalies found to each other, to the patient's previous history and personality, and to her present circumstances was investigated as it would be in any psychiatric case.

(a) **Physiological.**—Flushings had occurred in all the castrated patients but one (a woman of 48 who had been likewise free from most of the menopausal discomforts). There was considerable variation in the time of onset, total duration, and severity of the flushings. In three women, aged 45, 46, and 48, they had been noticed for a year before the operation, though other indications of the menopause had not been evident in two of them: in another woman whose periods had ceased at 33, i.e. 7 years before the operation, without discoverable physical cause, the flushings did not come on until 2 years after the operation. Four of the women had no flushings until 1, 2, or 3 years after the operation: another first had them 6 months after the operation. The total duration varied between 6 months and 5 years: when lengthy they had gradually lessened in severity and frequency after about two years, except in one patient, aged 41, in whom they had become worse as time went on. In three women they had at one time been very severe, in 11 they had been pronounced, in 10 definite but slight; it was found impracticable to grade them, as Albright (1936) did, according to frequency per day, because they had gradually changed in frequency, and reliable data were therefore not forthcoming. Giddiness, breathlessness, and headaches seemed so often to be concomitants of the flushing attacks that it is appropriate to consider them at this point. Eleven of the patients had giddiness, along with flushings; it was never severe and never led to falls or syncope. Breathlessness was reported by 10 of the same 11, with the flushing; and by two others, also with flushing: it was not severe, and was occasionally the accompaniment of palpitations. Headaches were reported as having developed after the operation, in 10 women, of whom only one had them severely.
The same phenomena in Group B were by no means as infrequent as had been expected. Thirty-two women had flushings, 12 fairly severely. In two they had been noticed before the operation. In 12 they had begun within the first 6 months after the operation and had continued for periods varying between 3 months and 4 years. In 14 they had begun from 1 to 5 years after the operation; the average age of these women at the time of operation was 40, the youngest being 30 years old. Giddiness was reported in 22, always with flushing, except in one woman with heart failure; in another, both giddiness and flushings had since the operation coincided with the cataleptic attacks to which she had been prone from the age of 21. Breathlessness was a symptom in 23, but many of these had complained of it for months or years before the operation. It was more often said to be brought on by exertion in this group than in Group A. The concurrence of flushing with giddiness and breathlessness in the same patients was as striking in Group B as in Group A.

_Weight._—Sixteen of Group A had increased in weight, some grossly. Eighteen of Group B had increased, though in two of these the weight had later returned to normal; the increase was often between 2 and 3 stone; in one woman (aged 39) 4 stone.

_Hair._—Four of Group A had had superfluous hair growing on chin and upper lip since the operation (in one of them to a disfiguring extent). This had not occurred in any of Group B: one of them, however, had been temporarily quite bald after the operation.

_Sleep._—Six of Group A and four of Group B slept badly. Two of Group A and seven of Group B had poor appetite or indigestion.

_Pains._—Fifteen of Group A complained of pains (chiefly backache): possibly rheumatoid joint changes were reported in four. Thirty-three of Group B had pains (chiefly discomfort in loins; also in abdomen, limbs, or genitals). In both groups there were many who reported dryness and discomfort in their genitals, sometimes making coitus impossible. Five of Group A and 14 of Group B had cramps in their legs or numbness and tingling.

_Cyclical_ changes were sought for, especially in regard to sensations in the breasts. Of Group A seven, and of Group B 26, reported more or less periodic feelings of the kind formerly associated with menstruation. In only five, however, all in Group B, were these noticed to occur with monthly regularity.

_Libido._—Enquiry into the effects of the operation upon sexual desire and gratification was hampered not by their reticence, for they were almost all willing to supply the desired information, but by the preceding frigidity which in so many of them had for years made overt sexuality empty or disagreeable to them. Apart from the two single women, data were obtained from all the patients in Group A: 13 had now less libido than before the operation, and little or no gratification, pain in coitus being apparently responsible for this in four of them. None (including those who had been frigid before) reported any increase of desire since the operation. In Group B no satisfactory information on the point was obtained concerning six patients: of the remainder 16 had lessened libido and two reported an increase, but it seemed in these two that
removal of the fear of pregnancy, which had previously interfered with sexual gratification, was responsible for the apparent change.

(b) Psychological.—There was only one instance of insanity after the operation: this was a very brief episode occurring in a previously normal woman of 38, while she was still in the surgical ward recovering from a cesarean section and subtotal hysterectomy.

Some of the features conspicuous in involitional melancholia were not discoverable, even in attenuated form, in any of these patients: this is true of paranoid tendencies and of hypochondriacal notions about the bowels.

Anxiety, tension, and restlessness or phobias were present in 14 of Group A and 35 of Group B. Eight of these in Group A and 16 in Group B had always been of a worrying temperament or had had fears before their operation. In only five of Group A and seven of Group B was the anxiety severe enough to be regarded as troublesome; none of the patients had sought treatment for it. In many instances of Group B and two of those in Group A there were adequate external grounds for worrying. A majority of the patients who in each group reported severe flushings said also that they got easily flustered. Five patients mentioned spontaneously their fears about cancer, due to ignorance of the nature and purpose of their operation: the impression was gained that many more, if questioned directly on the point, would have reported this too.

Depression, with tiredness, lack of confidence, and difficulty in concentration, was reported in 15 of Group A and in 26 of Group B. In all of those in Group A it had come on soon after the operation and had gradually become less. In Group B it had less obvious relation to the operation, in many instances being more a continuation of ill-health and general weariness that had gone on for a long time before the operation. In both groups it was variable or intermittent. In three of Group A and six of Group B it had been fairly severe, accompanied by suicidal inclinations, much weeping, hopelessness, or self-reproach: in one patient of Group A it had centred in the disfigurement due to hair growing on her chin and lip, and in several of Group B in their notions about cancer. In none of the cases had there been hospital treatment for the depression. Variability of mood was frequently reported in both groups.

Irritability occurred in nine of Group A and 14 of Group B; all these had also anxiety. Memory was said to be impaired in 10 of Group A and in 13 of Group B. Obsessional or hypochondriacal symptoms had occurred in five of Group A and in five of Group B.

Altogether there were 13 in Group A, and 17 in Group B who had definite and troublesome neurotic symptoms of one kind or another.

Discussion

The differences between the two groups, in respect of psychological disturbances after the operation, would not appear to be significant (X²=0.44) especially in view of the nature of the data in question and the difficulties of recording and assessing them on any uniform scale. From this it might
perhaps be inferred that the endocrine factor in menopausal anxiety and depression is negligible, and that the latter must be regarded as a psychological reaction to the loss of fertility, with all its implications. There are objections to both these inferences. The investigation was not designed to provide any positive information about the latter of them; one could go no farther than to say, if endocrine influence be excluded, that in both groups there was the same situation, due to their surgically produced inability to have more children, and that it might have acted psychologically to produce much the same results in each. Alternative interpretations would have to be considered, based on the previous personality and disposition to neurotic instability in these patients, or on the effects of a long, alarming, or exhausting illness, and on the physical and psychological stresses of a severe abdominal operation: the two latter issues point to the difficulty of comparing these patients, at any rate during the first year of their post-operative period, with women passing through the menopause spontaneously. The psychological disturbances reported by Binder (1937) in women after sterilization by tubal resection and by Krauss (1932) in castrated women show how many factors need consideration. But, apart from this, the inference as to endocrine factors being negligible cannot be drawn, since it seems likely that in some of the non-castrated patients endocrine changes similar to those of the normal or artificial menopause have ensued during the four post-operative years covered by the investigation. It is true that the patients in the non-castrated group were on the whole younger than the other, in whom presumably the imminence or suspected occurrence of the menopause was the main factor in deciding the surgeon as to whether he would leave the ovaries or not, but still 19 of them were over 40, and all but 10 were over 35. There is, further, the possibility, much more remote and controversial, that removal of the uterus has an influence on endocrine activity, especially of the ovaries; experiments on the immediate effects in primates have not confirmed the positive findings reported in some lower mammals, but there are no experiments to show whether hysterectomy hastens the inevitable onset of the menopause. Whatever the mechanism, more than half of the women in this series whose ovaries had not been removed developed the physical concomitants of the menopause during the post-operative period investigated; it is reasonable to suppose, therefore, that they may have been passing through a phase of endocrine changes similar to those of the castrated women.

Physical, especially vasomotor, phenomena, such as hot flushing, being more reliable and specific than psychological ones as an indication of the menopause, and most writers concurring in the view that they are due to endocrine changes, it is necessary to see how many of those in each group who showed pronounced psychological changes also had troublesome physical changes of the menopause. In the 13 affected patients of Group A there were eight with severe flushings, etc., and in the 17 of Group B eight also. If, however, all those with definite psychological disturbances who had flushings at all, with or without other physical phenomena associated with the menopause, be included, then there were 13 of these in Group A and 11 in Group B, i.e. all of those in
ARTIFICIAL MENOPAUSE AND Hysterectomy

Group A who were showing pronounced neurotic symptoms were showing physical evidence of the menopause, as would be expected, and two-thirds of those in Group B. The remaining six patients with psychological illness in Group B suffered from depression closely related to their previous personality and to troubles (financial and domestic) that they had had to cope with during the ensuing years.

It is obvious that many of the uncertainties in this investigation could have been avoided, without detriment to comparability, if the patients had all been under the age of 35 (so that a spontaneous menopause would have been improbable in most of the non-castrated women), and if regular examination of the patients, including measurement of the output of oestrogen and gonadotropic hormone, had been carried out at 6-monthly intervals during the 4 or 5 years after the operation. Unfortunately these conditions could not be met; the reasons are obvious. The clinical findings collected in the way described are not, however, barren. They indicate that even though predisposition to mental illness, and stresses of daily life (poverty, bereavement, illness) could be held to account, in part, for the neurotic symptoms that developed, there is a probably significant association of these symptoms with the accepted phenomena of the menopause. It is, moreover, evident that the psychological disturbances accompanying the menopause are not a clinical entity, but exhibit in more pronounced form the individual tendencies already manifest in these patients long before the operation. The same is probably true of the most severe "menopausal" psychosis.

Summary

It was thought that the differences in neurotic symptoms between women whose ovaries had been removed and those who had had only a hysterectomy might throw light on the relative causal importance of endocrine changes and psychological reactions.

The findings in 25 "castrated" women and 42 with hysterectomy are recorded for the 4 years after the operation.

Grounds are given for supposing that in many of the non-castrated women the menopause had subsequently supervened, thus accounting for the finding that there were only statistically insignificant discrepancies between the two groups in respect of neurotic symptoms.

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